Mathematics for the Technologies 2

Course Description

Mathematics for the Technologies 1 and Math for the Technologies 2 course competencies are presented as two-year consecutive, sequential courses that meet the state Algebra 1 standards. The Algebra 1 end-of-course test will be given at the completion of Mathematics for the Technologies 2.

Mathematics for the Technologies is a program of mathematical studies focusing on the development of the student's ability to understand and apply mathematics to solve realistic workplace problems. Skills in algebra are taught through an integrative approach. Emphasis is on active participation through appropriate project work, laboratory activities, group and individual assignments, discussion, practice, and exposition. Students are expected to use scientific calculators, graphing calculators, and/or computers throughout the year. Instructors are encouraged to work with occupational instructors and local business and industry personnel to incorporate career and technology applications of mathematics.

It is recommended that class size be no larger than twenty-two students due to the hands-on, laboratory-based nature of the courses.

Recommended Prerequisites

Students entering this course should have successfully completed Mathematics for the Technologies 1 or have completed Algebra 1 but with minimal success.

Course Outline

All of the following items are identified as eligible for end-of-course testing and are essential for success in subsequent mathematics courses.

I. Generalizations, algebraic symbols, and matrices.
   A. Represent very large and very small numbers in **Algebra 1: I.C.1.**
      1. Exponential form.
      2. Scientific form (interpreting calculator display).
   B. Identify and use properties related to operations with matrices. **Algebra 1: I.C.6.**
      1. Addition.
      2. Subtraction.
      3. Scalar multiplication.
   C. Solve applied problems using matrices. **Algebra 1: I.C.6.**

II. Algebraic expressions in problem-solving situations.
   A. Find specific function values, and evaluate expressions. **Algebra 1: I.D.1.**
   B. Use patterns to generate the laws of exponents. **Algebra 1: III.B.1**.
      1. Multiplication.
      2. Division.
      3. Power raised to a power.
   C. Apply the laws of exponents in problem situations. **Algebra 1: III.B.1**.
   D. Simplify polynomial expressions using **Algebra 1: I.D.2.**
      1. Multiplication.
      2. Division by monomial.
   E. Investigate factoring techniques using **Preliminary to Algebra 1: I.D.3.**
      1. Greatest common factor.
      2. Difference between squares.
      3. Quadratic trinomial.
      4. Grouping.

I. Interpretations.
   A. Relate direct variation to linear functions. **Algebra 1: II.B.7.**
   B. Solve problems involving proportional change. **Algebra 1: II.B.7**.

II. Linear functions and data representations.
   A. Extend the study of linear functions. **Algebra 1: I.B.2.; II.A.2**.
      1. Domain.
      2. Range.
      3. Graph interpretations.
   B. Represent, display, and interpret data, including representations on graphing calculators and computers. **Algebra 1: I.B.4.**
      1. Scatter plots.
      2. Stem-and-leaf plots.
      3. Box-and-whiskers diagrams.
   C. Write a linear equation that fits a data set, check the model for "goodness-of-fit," and make predictions using the model. **Algebra 1: I.B.5.**

III. Systems of linear equations.
   A. Analyze situations and formulate systems of linear equations to solve problems. **Algebra 1: II.D.1.**
   B. Solve systems of linear equations using **Algebra 1: II.D.2.**
      1. Concrete models.
      2. Graphs.
      3. Tables.
      4. Algebraic methods (e.g., elimination, substitution) including Computer Algebra Systems (CAS), spreadsheets, and graphing calculators.
   C. For given contexts, interpret and determine the reasonableness of solutions to systems of linear equations. **Algebra 1: II.D.3.**

IV. Linear and quadratic functions and data representations.
   A. Identify the parent functions. **Algebra 1: I.B.1.**
      1. Linear ($y = x$).
      2. Quadratic ($y = x^2$).
   B. Sketch the parent functions. **Algebra 1: I.B.1.**
      1. Linear ($y = x$).
      2. Quadratic ($y = x^2$).

V. Quadratic functions.
   A. Determine the domain and range values for quadratic functions given the constraints of the problem. **Algebra 1: III.A.1**.
   B. With and without using a graphing calculator, investigate, describe, and predict the effects of changing the
      1. Constant a on the graph of $y = ax^2$. **Algebra 1: III.A.2**.
      2. Constant c on the graph of $y = x^2 + c$ **Algebra 1: III.A.3.**
   C. For problem situations, analyze graphs of quadratic functions, and draw conclusions. **Algebra 1: III.A.4.**
   D. Solve quadratic equations using **Algebra 1: I.D.3.; III.A.5.**
      1. Concrete models.
      2. Tables.
      3. Graphs.
      4. Algebraic methods that include factoring and using the quadratic formula, as well as CAS, spreadsheets, and graphing calculators.
   E. Relate the solutions of quadratic equations to the roots of the function. **Algebra 1: III.A.6.**

VIII. Other functions.
   A. Data as functions. **Algebra 1: III.B.2.,3.**
      1. Inverse variation.
      2. Exponential growth and decay.
   B. Data as representations. **Algebra 1: III.B.2.,3**.
      1. Concrete models.
      2. Tables.
      3. Graphs.
      4. Algebraic methods as well as CAS, spreadsheets, and graphing calculators.

IX. Relationships (Insert this section as appropriate in the content outline.)
   A. Describe independent and dependent quantities in functional relationships. **Algebra 1: I.A.1.**
   B. Interpret and make inferences from explicit and recursive functional relationships. **Algebra 1: I.A.6.**